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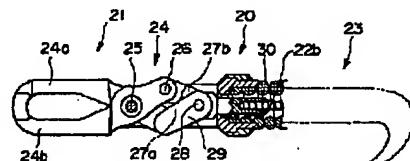
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(54)【発明の名称】内視鏡用処置具

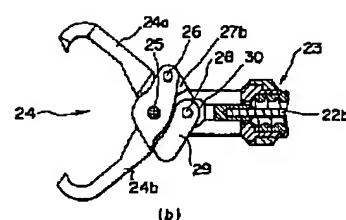
(57)【要約】 (修正有)

【目的】鉗子部の構成部品を軸支する接続部材にかしめ不良や溶接不良が発生しても接続部材が脱落しない内視鏡用処置具を提供する。

【構成】内視鏡用処置具20は、操作部22と、この操作部22の前方に延設されたシース23と、このシース23先端に設けた鉗子部24とから成る。鉗子部24には一対の鉗子部材24a及び24bが配設されており、鉗子部材24a及び24bは、第1の頭付きピン25で軸支されている。鉗子部材24a及び24bの基端部とアーム部材27a及び27bの一端部とは、接続部材である第2の頭付きピン26によって軸支されている。アーム部材27a及び27bの第2の頭付きピン26の頭部側面にはカバー部材29が一体となるように接着され、カバー部材29が接着されて一体となったアーム部材27a及び27bの他端部は第3の頭付きピン28によりつなぎ部材30に軸支されている。



(a)



(b)

【特許請求の範囲】

【請求項1】 内視鏡の処置具挿入用チャンネル内に挿通させて使用する内視鏡用処置具において、挿入部先端に配設される開閉自在な一对の鉗子部材と、この一对の鉗子部材に接続部材によってそれぞれ回動自在に軸支されるアーム部材と、前記接続部材の少なくとも頭部側の一方を被うカバー部材と、前記アーム部材の他端部を回動自在となるように軸支すると共に、後端から操作ワイヤを延出するつなぎ部材と、を具備することを特徴とする内視鏡用処置具。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、内視鏡の処置具挿入用チャンネル内に挿通して使用される把持鉗子などの内視鏡用処置具に関する。

【0002】

【従来の技術】近年、体腔内に細長の挿入部を挿入することにより、体腔内臓器などを観察したり、必要に応じ処置具用チャンネル内に処置具を挿通して術者の目視観察下、或いは、モニタ観察下で各種治療処置の行える医療用内視鏡が広く利用されている。また、工業分野においても、ボイラ、タービン、エンジン、化学プラントなどの内部を観察することのできる工業用内視鏡が広く利用されている。そして、前記内視鏡の付属品、或いは、内視鏡と併用して、さらには単独で用いられる処置具に生検鉗子や把持鉗子などがある。

【0003】図9に示すように生検鉗子1は、手元側に設けた操作部2と、この操作部2の前方に延設される細長な可撓性のシース3と、このシース3の先端部に設けられた鉗子部4とにより構成されている。前記鉗子部4は、一对の生検カップを先端に設けた鉗子部材5a及び5bを前記シース3の先端に接続された先端チップ6の先端部に第1のピン7で軸支している。前記鉗子部材5a及び5bの基端部は、第2のピン8によってパンタグラフ機構9を成すアーム部材10a及び10bの一端に取り付けられている。そして、前記アーム部材10a及び10bの他端は、第3のピン11によりワイヤ接続具12に連結されている。前記ワイヤ接続具12は、前記シース3の中を挿通して前記操作部2に設けられたスライダ13に接続されている鉗子部開閉用のワイヤ14に接続されている。前記ワイヤ14は、スライダ13の後方に設けた押さえ環15とスライダ13とを前後に進退することにより前記ワイヤ接続具12を軸方向に進退させてパンタグラフ機構7を介して鉗子部4を開閉操作するようになっている。

【0004】図10の(a)及び(b)に示すように前述の鉗子部4のパンタグラフ機構9を構成する鉗子部材5aとアーム部材10aとは、この鉗子部材5aに設け

た透孔5cとアーム部材10aに設けた透孔10cとを一致させて、前記透孔10c及び透孔5cに第2のピン8を挿通すると共に、前記第2のピン8の先端8aにかしめ部8bを設けることによって回動自在に軸支している。しかし、図の(c)に示すように前記第2のピン8の先端8aのかしめ部8bが形成されなかったり、形成されても小さいなどのかしめ不良に気づかず鉗子部4を形成してしまうと、この鉗子部4を繰り返し開閉操作することによって第2のピン8が矢印A方向に脱落してしまう。また、図の(d)に示すように第2のピン8の先端部8aに溶接部8dを設けて軸支する方法もあるが、溶接状態によっては鉗子部4の開閉操作のときに前記溶接部8dと第2のピン8との溶接面に応力が働いて第2のピン6が脱落してしまう。

【0005】

【発明が解決しようとする課題】上述のように鉗子部のパンタグラフ機構を構成する鉗子部材とアーム部材とは、鉗子部材に設けた透孔及びアーム部材に設けた透孔に接続部材としての頭付きピンを挿通して、この頭付きピンの先端部をかしめたり溶接することによって回動自在となるように軸支されていた。

【0006】しかしながら、鉗子部を開閉操作するときに接続部材にかしめ不良や溶接不良があると接続部材が脱落する虞がある。もしこのような事態が観察部で発生すると、前記鉗子部は、例えば、開状態から閉状態にすることができない、処置具挿入用チャンネル内を挿通させることができなくなる。また、頭付きピンなどの脱落部品を回収するための作業が必要となる。

【0007】本発明は上記事情に鑑みてなされたもので、鉗子部の構成部品を軸支する接続部材にかしめ不良や溶接不良が発生しても接続部材が脱落しない内視鏡用処置具を提供することを目的としている。

【0008】

【課題を解決するための手段】本発明による内視鏡用処置具は、内視鏡の処置具挿入用チャンネル内に挿通させて使用する内視鏡用処置具において、挿入部先端に配設される開閉自在な一对の鉗子部材と、この一对の鉗子部材に接続部材によってそれぞれ回動自在に軸支されるアーム部材と、前記接続部材の少なくとも頭部側の一方を被うカバー部材と、前記アーム部材の他端部を回動自在となるように軸支すると共に、後端から操作ワイヤを延出するつなぎ部材と、を具備する。

【0009】

【作用】この構成で、操作ワイヤを牽引操作することによってつなぎ部材は進退する。このつなぎ部材の進退に対応してアーム部材及び鉗子部材が回動して一对の鉗子部材が開閉する。前記アーム部材と鉗子部材とを回動自在に接続している接続部材は、カバー部材によって前記接続部材の頭部側を被われているので脱落することが無

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【実施例】以下、図面を参照して本発明の実施例を説明する。図1ないし図5は本発明の一実施例に係り、図1は鉗子部の部品構成を示す分解斜視図、図2はV字型鉗子の鉗子部材とアーム部材との接続状態を組み立て状態を示す説明図、図3は鉗子部とつなぎ部材との概略構成を示す斜視図、図4は鉗子部の接続部材と他の構成部品との関係を示す説明断面図、図5は内視鏡用処置具の概略構成を示す説明図である。

【0011】図5の(a)に示すように内視鏡用処置工具20は、例えば、V字型鉗子21であり手元側に設けた操作部22と、この操作部22の前方に延設された可撓性を有する細長なシース23と、このシース23の先端部に設けた鉗子部24により構成されている。前記鉗子部24には一对の鉗子部材24a及び24bが配設されており、前記鉗子部材24a及び24bは、シース23の先端に接続した図示しない先端カバー部材の先端部に第1の頭付きピン25で回動自在となるように軸支されている。そして、前記鉗子部材24a及び24bの基端部とアーム部材27a及び27bの一端部とは、接続部材である第2の頭付きピン26によって回動自在に軸支されている。さらに、前記アーム部材27a及び27bの第2の頭付きピン26の頭部側面にはカバー部材29が一体となるように接着される一方、カバー部材29が接着されて一体となったアーム部材27a及び27bの他端部は第3の頭付きピン28によりつなぎ部材30に回動自在に軸支されている。また、前記つなぎ部材30の後端と操作部本体22aの先端とは、前記シース内を挿通する鉗子部開閉用の操作ワイヤ22bによって接続されている。前記操作ワイヤ22bと操作部本体22aとは、スライダ固定機構22cによって着脱自在に接続されており、スライダ22dを把持して操作部本体22aを前後に進退させることによって前記つなぎ部材30を軸方向に進退させて図の(a)に示すように鉗子部24を閉状態にしたり、図の(b)に示すように鉗子部24を開状態にしたりすることができるようになっている。

【0012】図1に示すように内視鏡用処置具20の鉗子部24は、一对の鉗子部材24a及び24bと、この鉗子部材24a及び24bに第2の接続部材である頭付きピン26で回動自在に接続されるアーム部材27a及び27bと、このアーム部材27a及び27bに挿通する頭付きピン26の頭部側面に接着固定されるカバー部材29a及び29bと、前記アーム部材27a及び27bを第3の接続部材である頭付きピン28でそれぞれ回動自在になるように接続されるつなぎ部材17とから構成されている。

【0013】そして、前記鉗子部材24a及び24bの中央基部には、鉗子部開閉の際の中心軸となる透孔24

cが設けられ、他端部側には前記アーム部材27a及び27bを回動自在に接続するためのかしめ孔付き透孔24dが設けられている。また、前記アーム部材27a及び27bには前記鉗子部材24a及び24bのかしめ孔付き透孔24dと一致する位置に皿孔付き透孔27cが設けられると共に、他端部には操作用ワイヤ22bを延出するつなぎ部材30に回動自在に接続するための頭付きピン28を挿通する透孔27dが設けられている。さらに、前記カバー部材29aには前記頭付きピン28の先端をかしめるためのかしめ孔付き透孔29cが設けら

10 先端をかしめるためのかしめ孔付き透孔29cが設けられ、カバー部材29bには前記頭付きピン28を挿通するための皿孔付きの透孔29dが設けられている。

【0014】上述のように構成されている内視鏡用処置具20の組立を説明する。まず、図2の(a)に示すように鉗子部材24bとアーム部材27bとは、鉗子部材24bの基端部に設けたかしめ孔付き透孔24dとアーム部材27bの皿孔付き透孔27cとを一致させた透孔に第2の接続部材である頭付きピン26を挿通すると共に、この頭付きピン26の先端部をかしめて回動自在に

20 軸支している。また、前記鉗子部材24aとアーム部材27aも前記鉗子部材24bとアーム部材27bと同様に回動自在に接続されている。

【0015】次に、図2の(b)に示すようにアーム部材27bの皿孔付き透孔27cの皿孔側平面にカバー部材29bを配置すると共に、前記アーム部材27bの頭付きピン挿通用透孔27dとカバー部材29bの皿孔付き透孔29dとを一致させて接着剤などで一体固定する。同様に、前記アーム部材27aにもカバー部材29aが一体固定されている。そして、前記アーム部材27bに一体となっているカバー部材29bの透孔29c及び27dに頭付きピン28を挿通し、この頭付きピン28をつなぎ部材の透孔30aに挿通している。さらに、前記頭付きピン28をアーム部材27aの透孔27d及び29cに挿通させてから、頭付きピン28の先端部をかしめて回動自在になるように軸支している。このように形成されている状態が図3に示す鉗子部24の斜視図である。

【0016】最後に、図3に示すようにシース内に操作用ワイヤ22bを挿通して鉗子部材24a及び鉗子部材24bの基部中央に設けられている透孔24cを一致させると共に、鉗子部材24a及び鉗子部材24bを合致させてコイルシース23の先端にろう付けなどで固定されている先端カバー部材31の凹部31aに挿入して透孔24cと透孔31bとを一致させて頭付きピン25を挿通させてこの頭付きピン25の先端部をかしめて回動自在に軸支する。さらに、前記先端カバー31の頭付きピン25の頭部を外側カバー部材32によって被っている。なお、前記頭付きピン25の頭部を被うための外カバー部材17の後端内面には段差部が設けられており、先端カバー部材31の外周面に設けられた段差部に嵌合

し接着剤などで回転しないように固定している。

【0017】上述のように鉗子部24を構成することによって、図4に示すように第1の接続部材である頭付きピン25は、外カバー部材32によってピン頭部が被われるようになっており、第3の接続部材である頭付きピン28は先端カバー部材31によってピン頭部が被われるようになっている。さらに、第2の接続部材である頭付きピン26は、カバー部材29によってピン頭部が被われている。すなわち、それぞれの接続部材である頭付きピンは、この頭付きピンの頭部を必ず他の部材によって被われているので接続部材にかしめ不良が発生したときにも頭付きピンが鉗子部24から脱落することがない。

【0018】なお、前記頭付きピンの固定方法はかしめに限ることなく溶接などでもよい。

【0019】図6は本実施例の第1の変形例に係るカバー部材の概略構成を示す説明図である。図に示すように本実施例のカバー部材40にはアーム部材41との位置決めをするための位置決めよう突起部40aが2箇所設けられている。また、前記アーム部材41には前記カバー部材40の位置決めよう突起部40aに対応する位置に、前記カバー部材の位置決め突起40aと嵌合する位置決め溝41aを2箇所設けている。その他の構成は前記実施例と同様である。

【0020】上述のようにカバー部材40に位置決め用突起部40aを設け、アーム部材41に位置決め溝41aを設けることによってカバー部材40とアーム部材41とを接着する際の位置決めが容易に行うことができると共に、頭付きピン28を支点にしてカバー部材40がアーム部材41に対して回転して頭付きピン26を被う位置のずれをなくすことができる。その他の作用及び効果は前記実施例と同様である。

【0021】また、図7は本実施例の第2の変形例に係るカバー部材の概略構成を示す説明図である。図の(a)に示すようにカバー部材50は、略コの字型形状をしており、頭付きピン28が挿通する孔50aとアーム部材51の幅方向の位置を決めるための位置決め部50bが設けられている。

【0022】上述のようにカバー部材50を形成することによって、カバー部材及びアーム部材及びつなぎ部材に挿通した頭付きピン28をかしめるとき、カバー部材50がアーム部材27a及び27bとコの字状に係合し、且つ、直接ピンかしめ荷重が働く部分を切り欠いているので、カバー部材50の変形を少なくすることができるので、先端カバー部材31との干渉が発生し難くなる。

【0023】ところで、大型のボルト、ナットなどを把持回収するすめには、前記ボルト、ナットの大きさに対応させて鉗子部をできるだけ大型化する必要がある。しかし、鉗子部を大きくすることによって鉗子部の最大外

径は処置具挿通用チャンネル径より大きくなってしまうので、前記鉗子部を処置具挿通用チャンネル内を挿通させるためには処置具挿通用チャンネルのチャンネル径を太くしなければならない。また、内視鏡のチャンネル径を太くするということは、すなわち内視鏡の外径寸法を太径にすることになるので、今度は被検体内への挿入が困難になってしまう。そこで、処置具挿通用チャンネル径を変えることなく鉗子部を大型化した内視鏡用処置具を使用するときには、前記内視鏡用処置具の後端側を内視鏡先端側の処置具挿通用チャンネル出口から処置具挿通用チャンネル入口へ挿通させてから内視鏡を被検体内に挿入して作業をするには、内視鏡用処置具を先端側から挿通してたとき、或いは、後端側から挿通したときのどちらから挿通させたときにも同じ鉗子操作部を利用できるようにすれば作業性の向上を図ることができる。

【0024】図8は操作部に着脱自在なシースの基端部の構成及び作用を示す説明図であり、本内視鏡用処置具の操作部は前記実施例に使用している操作部22である。図の(a)に示すようにシース23の操作部側基端部には口金61がろう付けなどで固着されている。前記口金61は、大径部62と小径部63とから構成されており、前記大径部62には回転止め部材64が着脱自在に挿通されると共に、この回転止め部材64の位置決め用溝部62aが少なくとも1つ設けられている。そして、前記大径部62と小径部63との間には段部65が設けられている。さらに、前記口金61には軸方向に貫通孔66が設けられており、この貫通穴66にはコイルシース内を挿通している操作ワイヤー22bの末端に接続されている操作パイプ67が挿通している。なお、前記大径部62に着脱自在な回転止め部材64は、口金61に対して回転止め部材64の回転を規制するために少なくとも1つのピン64aが大径部62の溝部62aに係合するようにろう付けなどで固着して設けられている。なお、前記ピン64aが大径部62の溝部62aの端部に係止された状態のとき、口金61の端面と回転止め部材64の端面とが同一面となるように形成されている。また、前記操作パイプ67の端部にはスライダ22dに着脱自在となる固定具68が設けられている。

【0025】このように構成されている内視鏡用処置具20を内視鏡先端側の処置具挿入用チャンネル出口から挿通させるときには、前記回転止め部材64を大径部62から外して固定具68からチャンネル内に挿通していく。そして、前記固定具68が内視鏡操作部近傍の処置具挿入用チャンネル入り口から突出しさらに大径部62も突出した状態で回転止め部材64を口金61の大径部62に装着する。

【0026】図の(b)及び図の(c)に示すように、固定機構22cに設けられている回動環71を係止位置まで回動するとスライダ片72が回動環71の外径に対して偏心して設けられた周面カム73に沿って周動する

と共に、スライド片72が操作部本体22aに設けた透孔22e内を移動してスライド片72に設けられている小孔72aに口金61の段部65が嵌合するようになっている。すなわち、この口金61に設けた段部65と小孔72aとによって、固定機構22cへの着脱が自在に行われるようになっている。なお、ピン64aは、操作部本体22aのすり割り部22fに係合してシース23と操作部22の回転を規制するようになっている。

【0027】図の(d)及び図の(e)に示すように、スライダ22dに設けられている操作ボタン75を押しながら挿通孔76をスライダ22dに対して移動させてこのスライダ22dに設けた透孔22gと一致させてそこに固定具68を挿通する。前記固定具挿通後に前記操作ボタン75から手を離すとバネ77の不勢力によって接続部78に固定具68の段差部68aが嵌合して接続固定される。

【0028】上述のように、口金61を2体化することでシース23に容易に着脱することができるにより、内視鏡用器具20を器具用チャンネルの先端側から挿通する場合も、後端側から挿通する場合も同じ鉗子操作部を有効に利用することができる。

【0029】

【発明の効果】以上説明したように本発明によれば、鉗子部の構成部品を軸支する接続部材にかしめ不良や溶接不良が発生しても接続部材が脱落しない内視鏡用器具を提供することができる。

【図面の簡単な説明】

【図1】図1ないし図5は本発明の一実施例に係り、図1は鉗子部の部品構成を示す分解斜視図

【図2】V字型鉗子の鉗子部材とアーム部材との接続状態を組み立て状態を示す説明図であり、

(a) 鉗子部材とアーム部材との接続を示す説明断面図
(b) 鉗子部材の接続状態を示す説明断面図

【図3】鉗子部とつなぎ部材との概略構成を示す斜視図

【図4】鉗子部の接続部材と他の構成部品との関係を示す説明図

す説明断面図

【図5】(a) 内視鏡用器具の概略構成を示す説明図
(b) 内視鏡用器具の鉗子部の開状態を示す説明図

【図6】本実施例の第1の変形例に係るカバー部材の概略構成を示す説明図

【図7】本実施例の第2の変形例に係るカバー部材の概略構成を示す説明図

【図8】操作部に着脱自在なシースの基端部の構成を示す説明図であり、

10 (a) シース基端部及び口金及び固定具を示す説明図

(b) 固定機構の断面図

(c) 図(b)のC-C断面図

(d) スライダの概略説明断面図

(e) 図(e)のD-D断面図

【図9】図9及び図10は従来例に係り、図9は内視鏡用器具の概略構成を示す説明図

【図10】(a)は鉗子部材とアーム部材とをかしめて接続した状態を示す説明図

(b)は鉗子部材とアーム部材に設けた透孔に頭付きビンを挿通したときの状態を示す説明図

20 (c) 頭付きビンが脱落するときの状態を示す説明図
(d) 頭付きビンを溶接で接続したときの状態を示す説明図

【符号の説明】

20… 内視鏡用器具

22b… 操作ワイヤ

24a… 鉗子部材

24b… 鉗子部材

26… 接続部材

30… アーム部材

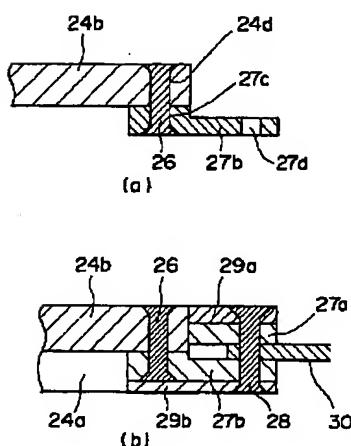
27a… アーム部材

29a… カバー部材

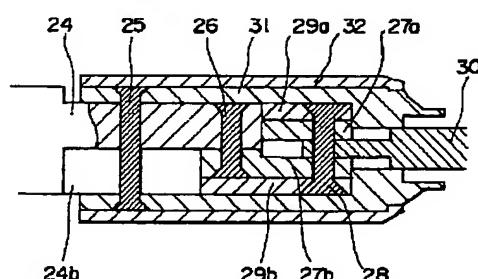
29b… カバー部材

30… つなぎ部材

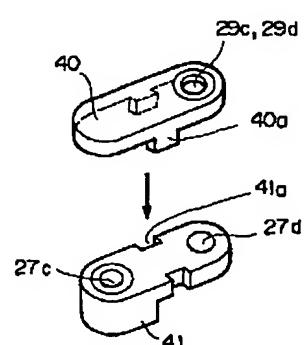
【図2】



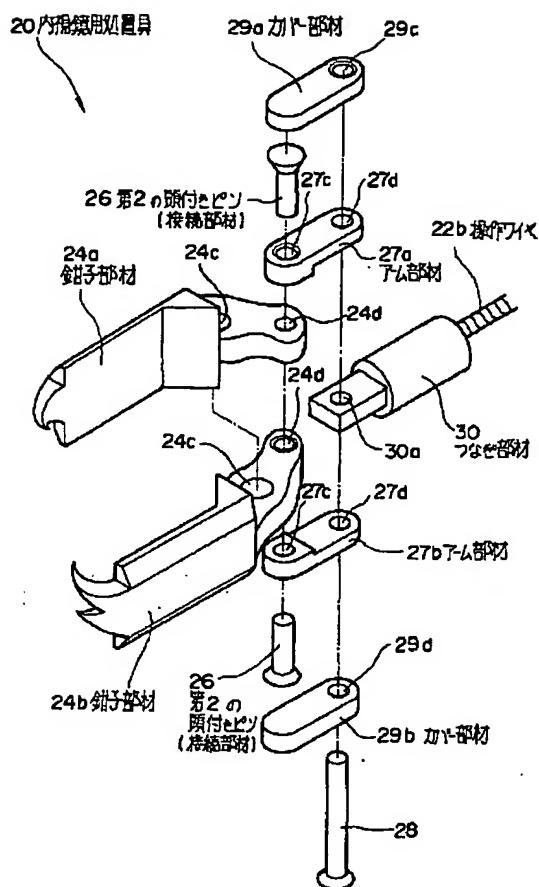
【図4】



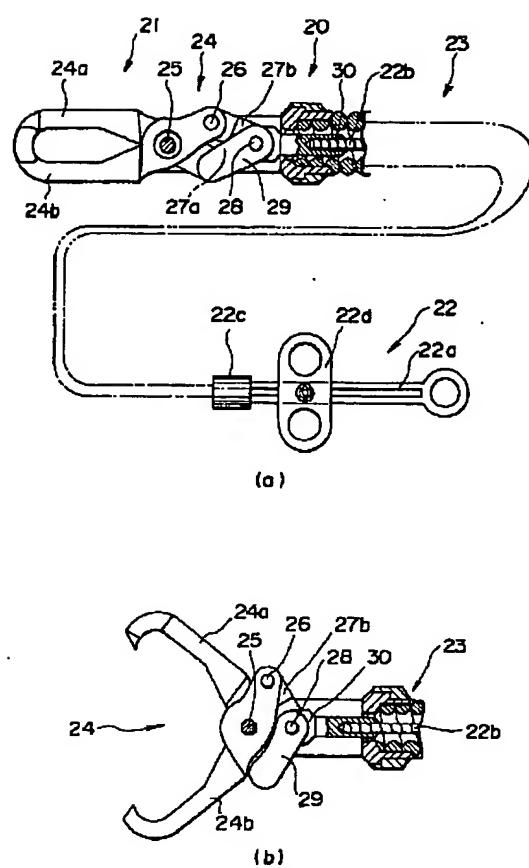
【図6】



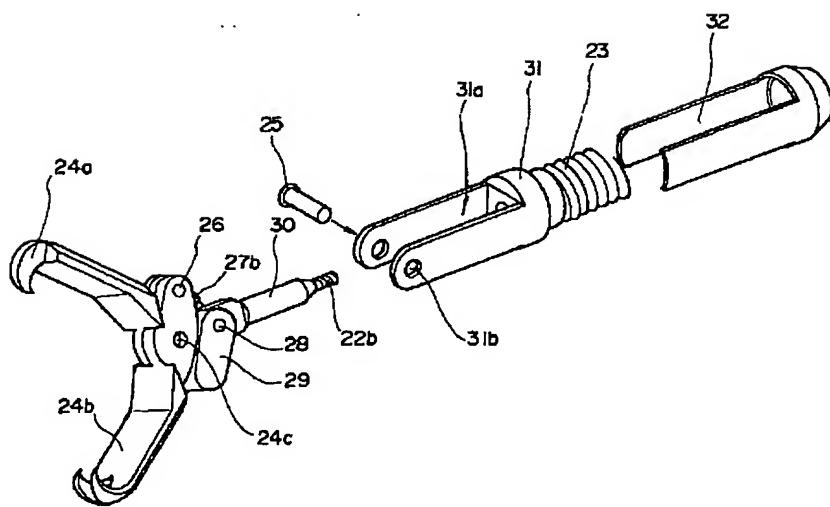
【図 1】



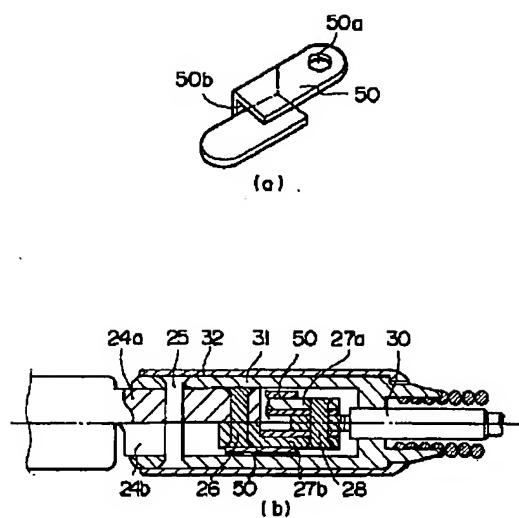
【図 5】



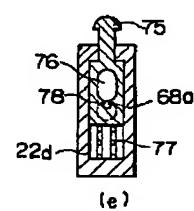
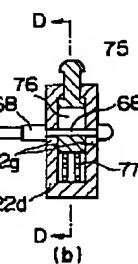
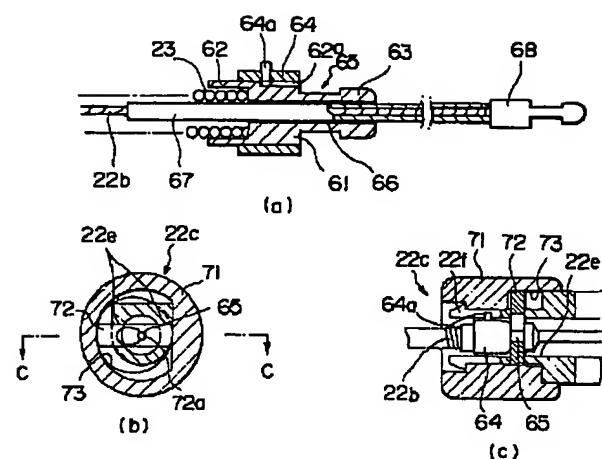
【図 3】



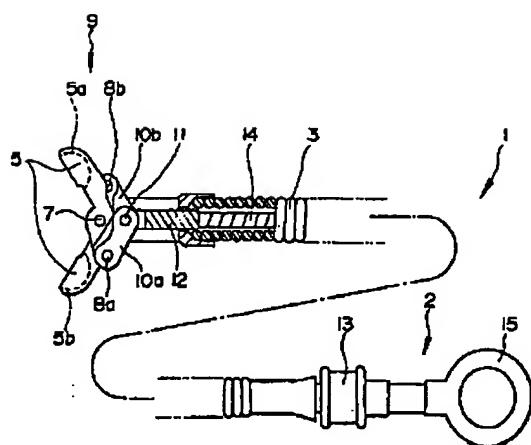
【図7】



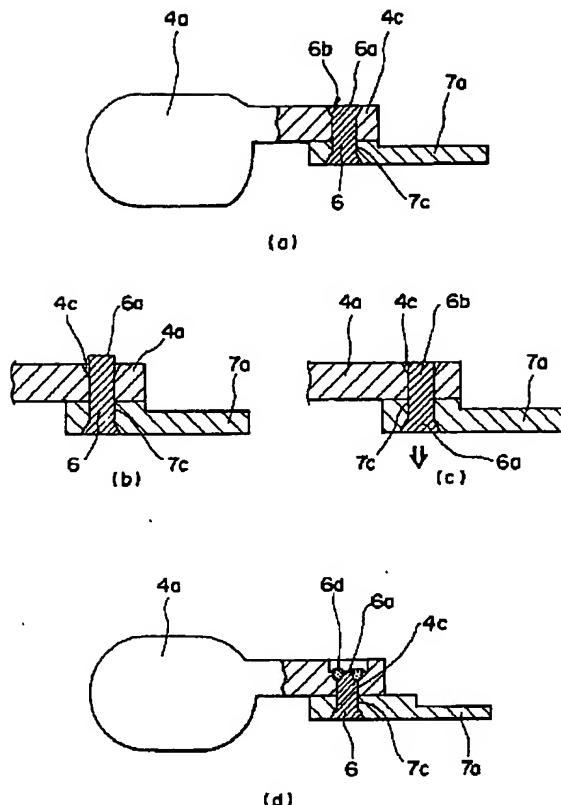
【図8】



【図9】



【図 10】



【手続補正書】

【提出日】平成 4 年 10 月 23 日

【手続補正 1】

【補正対象書類名】明細書

【補正対象項目名】0003

【補正方法】変更

【補正内容】

【0003】図 9 に示すように生検鉗子 1 は、手元側に設けた操作部 2 と、この操作部 2 の前方に延設される細長な可撓性のシース 3 と、このシース 3 の先端部に設けられた鉗子部 4 により構成されている。前記鉗子部 4 は、一対の生検カップを先端に設けた鉗子部材 5a 及び 5b を前記シース 3 の先端に接続された先端チップ 6 の先端部に第 1 のピン 7 で軸支している。前記鉗子部材 5a 及び 5b の基端部は、第 2 のピン 8 によってパンタグラフ機構 9 を成すアーム部材 10a 及び 10b の一端に取り付けられている。そして、前記アーム部材 10a 及び 10b の他端は、第 3 のピン 11 によりワイヤ接続具 12 に連結されている。前記ワイヤ接続具 12 は、前記シース 3 の中を挿通して前記操作部 2 に設けられたスライダ 13 に接続されている鉗子部開閉用のワイヤ 14 に接続されている。前記ワイヤ 14 は、スライダ 13 の後

方に設けた押さえ環 15 とスライダ 13 を前後に進退することにより前記ワイヤ接続具 12 を軸方向に進退させてパンタグラフ機構 9 を介して鉗子部 4 を開閉操作するようになっている。

【手続補正 2】

【補正対象書類名】明細書

【補正対象項目名】0005

【補正方法】変更

【補正内容】

【0005】

【発明が解決しようとする課題】上述のように鉗子部のパンタグラフ機構を構成する鉗子部材とアーム部材とは、鉗子部材に設けた透孔及びアーム部材に設けた透孔に接続部材としての頭付きピンを挿通して、この頭付きピンの先端部をかしめたり溶接することによって回動自在となるように軸支されていた。

【手続補正 3】

【補正対象書類名】明細書

【補正対象項目名】0012

【補正方法】変更

【補正内容】

【0012】図1に示すように内視鏡用器具20の鉗子部24は、一对の鉗子部材24a及び24bと、この鉗子部材24a及び24bに第2の接続部材である頭付きピン26で回動自在に接続されるアーム部材27a及び27bと、このアーム部材27a及び27bに挿通する頭付きピン26の頭部側面に接着固定されるカバー部材29a及び29bと、前記アーム部材27a及び27bを第3の接続部材である頭付きピン28でそれぞれ回動自在になるように接続されるつなぎ部材30とから構成されている。

【手続補正4】

【補正対象書類名】明細書

【補正対象項目名】0015

【補正方法】変更

【補正内容】

【0015】次に、図2の(b)に示すようにアーム部材27bの皿孔付き透孔27cの皿孔側平面にカバー部材29bを配置させると共に、前記アーム部材27bの頭付きピン挿通用透孔27dとカバー部材29bの皿孔付き透孔29dとを一致させて接着剤などで一体固定する。同様に、前記アーム部材27aにもカバー部材29aが一体固定されている。そして、前記アーム部材27bに一体となっているカバー部材29bの透孔29d及び27dに頭付きピン28を挿通し、この頭付きピン28をつなぎ部材30の透孔30aに挿通している。さらに、前記頭付きピン28をアーム部材27aの透孔27d及び29cに挿通させてから、頭付きピン28の先端部をかしめて回動自在になるように軸支している。このように形成されている状態が図3に示す鉗子部24の斜視図である。

【手続補正5】

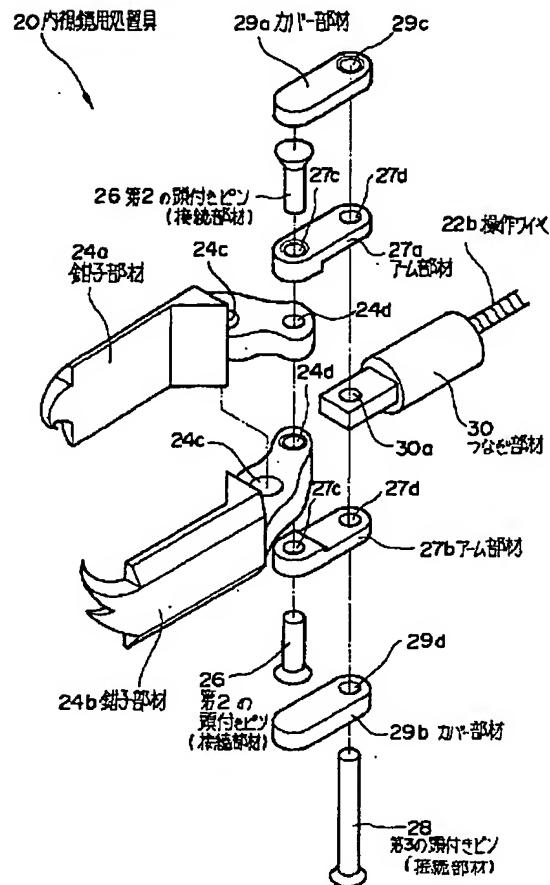
【補正対象書類名】図面

【補正対象項目名】図1

【補正方法】変更

【補正内容】

【図1】



【手続補正6】

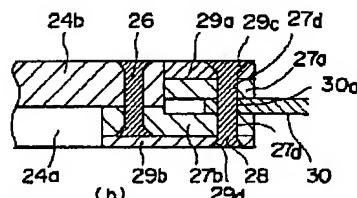
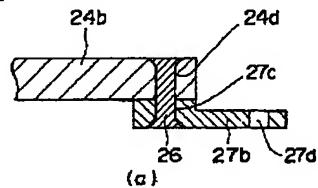
【補正対象書類名】図面

【補正対象項目名】図2

【補正方法】変更

【補正内容】

【図2】



【手続補正7】

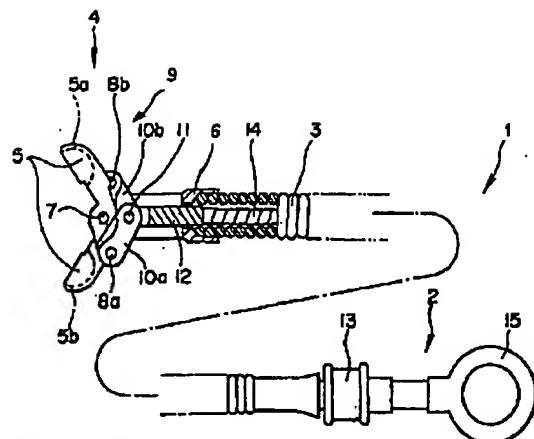
【補正対象書類名】図面

【補正対象項目名】図9

【補正方法】変更

【補正内容】

【図9】



【手続補正 8】

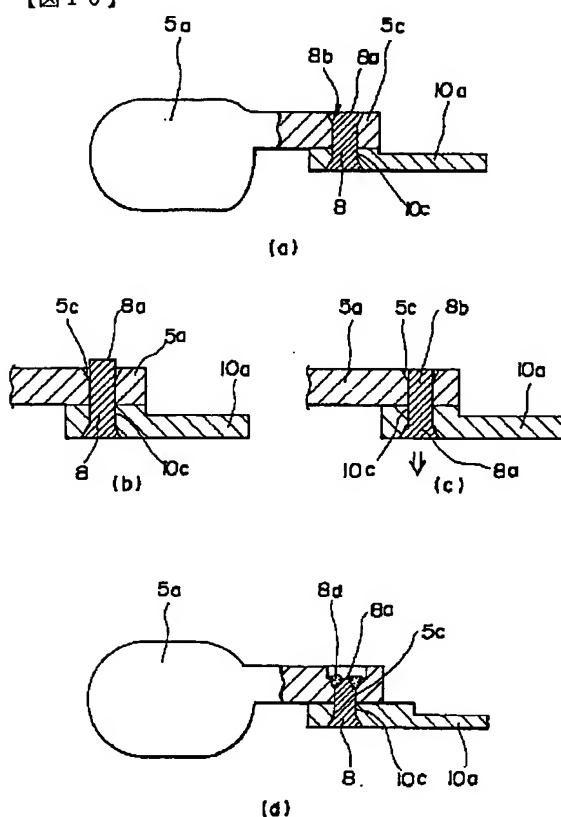
【補正対象書類名】図面

【補正対象項目名】図10

【補正方法】変更

【補正内容】

【図10】



Date: July 22, 2003

Declaration

I, Michihiko Matsuba, President of Fukuyama Sangyo Honyaku Center, Ltd., of 16-3, 2-chome, Nogami-cho, Fukuyama, Japan, do solemnly and sincerely declare that I understand well both the Japanese and English languages and that the attached document in English is a full and faithful translation, of the copy of Japanese Unexamined Patent No. Hei-5-317246 laid open on December 3, 1993.



Michihiko Matsuba

Fukuyama Sangyo Honyaku Center, Ltd.

TREATMENT DEVICE FOR ENDOSCOPE

Japanese Unexamined Patent No. Hei-5-317246

Laid-open on: December 3, 1993

Application No. Hei-4-127770

Filed on: May 20, 1992

Applicant: Olympus Optical Co., Ltd.

Inventor: Hidehiro JOKO

Patent Attorney: Susumu ITO

Specification

[TITLE OF THE INVENTION] TREATMENT DEVICE FOR ENDOSCOPE

[Abstract] (Amended)

[Object] A treatment device for an endoscope is provided in which a connecting member does not drop off even if a defect in caulking or a defect in welding occurs in the connecting member that pivotably supports a constituent element of a forceps portion.

[Composition] A treatment device 20 for an endoscope is made up of an operating portion 22, a sheath 23 extended in front of the operating portion 22, and a forceps portion 24 provided at the tip of the sheath 23. A pair of forceps members 24a and 24b are provided in the forceps portion 24, and the forceps

members 24a and 24b are pivotably supported by a first headed pin 25. The proximal end of the forceps members 24a and 24b and one end of arm members 27a and 27b are pivotably supported by a second headed pin 26 serving as a connecting member. A cover member 29 is integrally bonded to the side face of a head of the second headed pin 26 of the arm members 27a and 27b, and the other end of the arm members 27a and 27b to which the cover member 29 has been integrally bonded is pivotably supported by a third headed pin 28 on a connecting member 30.

[WHAT IS CLAIMED IS;]

[Claim 1] A treatment device for an endoscope used while being inserted through a treatment-device-insertion channel of the endoscope comprises:

 a pair of forceps members openably and closably provided at a tip of an insertion portion;

 arm members pivotably supported by the pair of forceps members, respectively, on a connecting member;

 a cover member covering at least one side of a head of the connecting member; and

 a connecting member pivotably supporting an opposite end of the arm members and extending a wire from a rear end thereof.

[DETAILED DESCRIPTION OF THE INVENTION]

[0001]

[Field of the Invention] The present invention relates to a treatment device for an endoscope, such as holding forceps, used while being inserted through a treatment-device-insertion channel of the endoscope.

[0002]

[Prior Arts] In recent years, wide use has been made of a medical endoscope with which internal organs in a body cavity can be observed by inserting a slender insertion portion thereof into the body cavity or with which various curative treatments can be performed by inserting a treatment device through a treatment-device channel if necessary while an operator is observing them by the naked eye or with a monitor. Likewise, in the industrial field, wide use has been made of an industrial endoscope with which the interior of a boiler, a turbine, an engine, a chemical plant, etc., can be observed. Biopsy forceps or holding forceps can be mentioned as a treatment device which is used as a subordinate device of the endoscope, or which is used together with the endoscope, or which is used alone.

[0003] As shown in Fig. 9, a biopsy forceps 1 is made up of an operating portion 2 provided at a proximal-end side, a flexible, slender sheath 3 extended in front of the operating portion 2, and a forceps portion 4 provided at the tip part of the sheath 3. The forceps portion 4 pivotably supports

forceps members 5a and 5b having a pair of biopsy cups at its tip by means of a first pin 7 at the front end of a tip chip 6 connected to the tip of the sheath 3. The proximal end of the forceps members 5a and 5b is attached to one end of arm members 10a and 10b forming a pantograph mechanism 9 by means of a second pin 8. The other end of the arm members 10a and 10b is connected to a wire connector 12 by means of a third pin 11. The wire connector 12 is connected to a forceps-opening-and-closing wire 14 which is passed through the sheath 3 and which is connected to a slider 13 provided at the operating portion 2. The wire 14 moves the wire connector 12 in the axial direction by moving back and forth the slider 13 and a pressure ring 15 provided behind the slider 13, and thereby opens and closes the forceps portion 4 through the pantograph mechanism 7.

[0004] As shown in (a) and (b) of Fig. 10, the forceps member 5a and the arm member 10a forming the pantograph mechanism 9 of the forceps portion 4 cause a through-hole 5c formed in the forceps member 5a and a through-hole 10c formed in the arm member 10a to coincide with each other so as to insert the second pin 8 into the through-hole 10c and the through-hole 5c, and the members 5a and 10a pivotably support them by providing a caulking portion 8b at the top 8a of the second pin 8. However,

as shown in (c) of the figure, if the caulking portion 8b at the top 8a of the second pin 8 is not formed or if the forceps portion 4 is formed without noticing a defect, such as smallness, in caulking when the caulking portion 8b is formed, the second pin 8 will drop off in the direction of an arrow "A" by repeatedly opening and closing the forceps portion 4. Additionally, as shown in (d) of the figure, although a possible method for pivotal support is to provide a welded portion 8d at the top 8a of the second pin 8, stress is exerted onto a welded surface between the welded portion 8d and the second pin 8 depending on a welded state when the forceps portion 4 is opened and closed, and the second pin 6 drops off.

[0005]

[Themes Intended to be Solved by the Invention] As mentioned above, the forceps member and the arm member forming the pantograph mechanism of the forceps portion have been pivotably supported by inserting the headed pin serving as a connecting member into the through-hole formed in the forceps member and the through-hole formed in the arm member and by riveting or welding the top of the headed pin.

[0006] However, there is a concern that the connecting member will drop off when the forceps portion is opened and closed if the connecting member has a defect in caulking or a defect

in welding. If this situation occurs in an observing portion, the forceps portion cannot reach a closed state, for example, from an opened state so that it cannot be passed through the treatment-device-insertion channel, and, as a result, it must be extracted from the observing portion together with the endoscope. Additionally, there is a need to perform the task of regathering dropped components like headed pins.

[0007] The present invention has been made in consideration of the aforementioned circumstances, and aims to provide a treatment device for an endoscope in which a connecting member does not drop off even if a defect in caulking or a defect in welding occurs in the connecting member that pivotably supports constituents of a forceps portion.

[0008]

[Means for Solving Themes] A treatment device for an endoscope used while being inserted through a treatment-device-insertion channel of the endoscope according to the present invention comprises a pair of forceps members openably and closably provided at a tip of an insertion portion; arm members pivotably supported by the pair of forceps members, respectively, by means of a connecting member; a cover member covering at least one side of a head of the connecting member; and a connecting member pivotably supporting an opposite end

of the arm members and extending a wire from a rear end thereof.

[0009]

[Action] With this structure, the connecting member is moved back and forth by pulling the operating wire. The arm member and the forceps member rotate in response to the back-and-forth movement of the connecting member, and the pair of forceps members are opened and closed. The connecting member pivotably connecting the arm member to the forceps member never drops off, because the head side of the connecting member is covered with the cover member.

[0010]

[Embodiment] An embodiment of the present invention will be hereinafter described with reference to the drawings. Fig. 1 through Fig. 5 are related to one embodiment of the present invention, Fig. 1 being an exploded perspective view that shows the component structure of a forceps portion, Fig. 2 being an explanatory drawing that shows a connected state and an assembled state between a V-shaped forceps member and an arm member, Fig. 3 being a perspective view that shows the schematic structure of the forceps portion and a connecting member, Fig. 4 being an explanatory sectional view that shows the relationship between the connecting member of the forceps portion and other constituent elements, and Fig. 5 being an

explanatory drawing that shows the schematic structure of a treatment device for an endoscope.

[0011] As shown in (a) of Fig. 5, a treatment device 20 for an endoscope, which is, for example, a V-shaped forceps instrument 21, is made up of an operating portion 22 provided at the proximal-end side, a flexible, slender sheath 23 extended in front of the operating portion 22, and a forceps portion 24 provided at the tip of the sheath 23. The forceps portion 24 is provided with a pair of forceps members 24a and 24b, and the forceps members 24a and 24b are pivotably supported on the front end of a tip cover member, not shown, connected to the tip of the sheath 23 by means of a first headed pin 25. The proximal end of the forceps members 24a and 24b and one end of arm members 27a and 27b are pivotably supported by a second headed pin 26 serving as a connecting member. Further, a cover member 29 is integrally bonded to the side face of a head of the second headed pin 26 of the arm members 27a and 27b, whereas the other end of the arm members 27a and 27b to which the cover member 29 has been integrally bonded is pivotably supported on a connecting member 30 by means of a third headed pin 28. The rear end of the connecting member 30 and the tip of the operating body 22a are connected together by a forceps-opening-and-closing operating wire 22b passed

through the sheath. The operating wire 22b and an operating body 22a are detachably connected by a slider fixing mechanism 22c, and the connecting member 30 is moved back and forth in the axial direction by moving the operating body 22a back and forth while holding a slider 22d, and the forceps portion 24 can be brought into a closed state as shown in (a) of the figure or can be brought into an opened state as shown in (b) of the figure.

[0012] As shown in Fig. 1, the forceps portion 24 of the endoscopic treatment device 20 is made up of the pair of forceps members 24a and 24b, the arm members 27a and 27b pivotably connected to the forceps members 24a and 24b by means of the headed pin 26 which is a second connecting member, cover members 29a and 29b firmly bonded to the side face of the head of the headed pin 26 inserted into the arm members 27a and 27b, and a connecting member 17 pivotably connecting the arm members 27a and 27b together by means of the headed pin 28 which is a third connecting member.

[0013] A through-hole 24c that serves as a center axis when the forceps portion is opened and closed is formed in a central base of the forceps members 24a and 24b, and a through-hole 24d with a caulking hole used to pivotably connect the arm members 27a and 27b is formed at the opposite end. The arm

members 27a and 27b have a through-hole 27c with a countersink at the position where the through-hole 27c coincides with the through-hole 24d of the forceps members 24a and 24b, and have a through-hole 27d for inserting the headed pin 28 used to be pivotably connected to the connecting member 30 from which the operating wire 22b is extended at the opposite end. Further, the cover member 29a has a through-hole 29c with a caulking hole used to caulk the top of the headed pin 28, and the cover member 29b has a through-hole 29d with a countersink used to insert the headed pin 28.

[0014] A description will be given of the assembly of the endoscopic treatment device 20 constructed as above. First, as shown in (a) of Fig. 2, the forceps member 24b and the arm member 27b are pivotably supported by inserting the headed pin 26, which is a second connecting member, into a through-hole where the through-hole 24d formed at the proximal end of the forceps member 24b coincides with the through-hole 27c of the arm member 27b and by riveting the top of the headed pin 26. Likewise, the forceps member 24a and the arm member 27a are pivotably connected in the same way as the forceps member 24b and the arm member 27b.

[0015] Thereafter, as shown in (b) of Fig. 2, the cover member 29b is disposed on the plane on the side of the countersink

of the through-hole 27c of the arm member 27b, and the headed-pin-inserting through-hole 27d of the arm member 27b is caused to coincide with the through-hole 29d of the cover member 29b, and they are united and fixed by an adhesive or the like. Likewise, the cover member 29a is united with and fixed to the arm member 27a. Thereafter, the headed pin 28 is inserted into the through-holes 29c and 27d of the cover member 29 united with the arm member 27b, and the headed pin 28 is inserted into a through-hole 30a serving as a connecting member. Thereafter, they are pivotably supported by inserting the headed pin 28 into the through-holes 27d and 29c of the arm member 27a and then riveting the top of the headed pin 28. The thus achieved condition is the perspective view of the forceps portion 24 shown in Fig. 3.

[0016] Lastly, as shown in Fig. 3, the operating wire 22b is passed through the sheath, the through-hole 24c formed at the center of the base of the forceps members 24a and 24b is then caused to coincide therewith, the forceps members 24a and 24b are then adjusted and inserted into a concave portion 31a of the tip cover member 31 fixed to the tip of the coil sheath 23 by, for example, soldering, the through-hole 24c is then caused to coincide with the through-hole 31b, the headed pin 25 is then inserted, and the top of the headed pin 25 is riveted

so as to be pivotably supported. Further, the head of the headed pin 25 of the tip cover 31 is covered with an outer cover member 32. A stepped portion is provided on the rear-end inner surface of the outer cover member 17 used to cover the head of the headed pin 25, and is fitted and fixed to a stepped portion provided on the outer peripheral surface of the tip cover member 31 with an adhesive or the like so as not to rotate.

[0017] As shown in Fig. 4, the headed pin 25 serving as a first connecting member has its pin head covered with the outer cover member 32, and the headed pin 28 serving as a third connecting member has its pin head covered with the tip cover member 31 by constructing the forceps portion 24 as above. The headed pin 26 serving as a second connecting member also has its pin head covered with the cover member 29. That is, since the headed pins serving as the connecting members, respectively, have their pin heads securely covered with other members, the headed pins never drop off from the forceps portion 24 even when a defect in caulking occurs in the connecting members.

[0018] Welding may be employed as one example of the method of fixing the headed pin, without being limited to caulking.

[0019] Fig. 6 is an explanatory drawing that shows the schematic structure of a cover member according to a first modification of this embodiment. As shown in the figure, a cover member 40

of this modification has two positioning projections 40a used to position an arm member 41. The arm member 41 has two positioning grooves 41a that are fitted to the positioning projections 40a, respectively, of the cover member at positions corresponding to the positioning projections 40a of the cover member 40. Other structures are the same as in the aforementioned embodiment.

[0020] Since the positioning projections 40a are provided on the cover member 40 and since the positioning grooves 41a are provided on the arm member 41 as described above, positioning can be easily performed when the cover member 40 is bonded to the arm member 41, and the position covering the headed pin 26 can be prevented from deviating while the cover member 40 rotates with respect to the arm member 41 with the headed pin 28 as a supporting point. Other operations and effects are the same as in the aforementioned embodiment.

[0021] Fig. 7 is an explanatory drawing that shows the schematic structure of a cover member according to a second modification of this embodiment. As shown in (a) of the figure, the cover member 50 is shaped nearly like a horseshoe, and a positioning portion 50b is provided for widthwise positioning the arm member 51 and a hole 50a into which the headed pin 28 is inserted.

[0022] Since the cover member 50 is engaged with the arm members 27a and 27b in the shape of a horseshoe by forming the cover member 50 as mentioned above when the headed pin 28 inserted into the cover member, into the arm member, and into the connecting member is riveted, and since the part on which pin-caulking load is directly imposed is cut off, the cover member 50 can be less deformed, and therefore interference with the tip cover member 31 does not easily occur.

[0023] Moreover, in order to hold and regather large-sized bolts, nuts, etc., there is a need to make the forceps portion as large as possible so as to be fitted to the size of the bolt or nut. However, if the forceps portion is enlarged, the maximum outer diameter of the forceps portion will become greater than the diameter of the treatment-device-passing channel, and therefore, in order to pass the forceps portion through the treatment-device-passing channel, the channel diameter of the treatment-device-passing channel must be increased. Additionally, since an increase in the channel diameter of the endoscope inevitably brings about an increase in the outer diameter of the endoscope, it becomes difficult to insert it into the body of a subject. Therefore, in a case where an endoscopic treatment device having a large-sized forceps portion is used without changing the diameter of the

treatment-device-passing channel, in order to perform operations such that the rear end of the endoscopic treatment device is inserted from an exit of the treatment-device-passing channel at the distal end of the endoscope to an entrance of the treatment-device-passing channel, and then the endoscope is inserted into the body of the subject, if the same forceps operating portion can be used either when the endoscopic treatment device is inserted from the distal end thereof or when inserted from the rear end thereof, workability can be improved.

[0024] Fig. 8 is an explanatory drawing that shows the structure and operation of the proximal end of a sheath attachable to and detachable from the operating portion. The operating portion of this endoscopic treatment device is the operating portion 22 used in the aforementioned embodiment. As shown in (a) of the figure, a mouthpiece 61 is fixed to the proximal end of the operating portion of the sheath 23 by, for example, soldering. The mouthpiece 61 consists of a large diameter part 62 and a small diameter part 63, and a rotation stopping member 64 is detachably inserted into the large diameter part 62, and at least one groove 62a for positioning the rotation stopping member 64 is provided. A stepped portion 65 is provided between the large diameter part 62 and the small diameter part 63. The

mouthpiece 61 has a through-hole 66 in the axial direction, and an operating pipe 67 connected to the end of the operating wire 22b which is passed through the coil sheath is inserted into the through hole 66. In order to restrict the rotation of the rotation stopping member 64 with respect to the mouthpiece 61, the rotation stopping member 64 attachable to and detachable from the large diameter part 62 is fixed by, for example, soldering so that at least one pin 64a can be engaged with the groove 62a of the large diameter part 62. The mouthpiece 61 and the rotation stopping member 64 are structured so that the end face of the mouthpiece 61 and the end face of the rotation stopping member 64 can become flush with each other in the state where the pin 64a is under engagement with the edge of the groove 62a of the large diameter part 62. Additionally, a fastening device 68 attachable to and detachable from the slider 22d is provided at the edge of the operating pipe 67.

[0025] When the endoscopic treatment device 20 constructed in this way is inserted from the exit of the treatment-device-insertion channel on the side of the distal end of the endoscope, the rotation stopping member 64 is detached from the large diameter part 62 and is inserted from the fastening device 68 into the channel. The rotation stopping member 64

is attached to the large diameter part 62 of the mouthpiece 61 in the state where the fastening device 68 juts from the entrance of the treatment-device-insertion channel in the vicinity of the operating portion of the endoscope and where the large diameter part 62 also projects therefrom.

[0026] As shown in (b) and (c) of the figure, when a rotational ring 71 provided in the fixing mechanism 22c is rotated to the engagement position, a slide piece 72 is moved along a peripheral cam 73 which is eccentric with respect to the outer diameter of the rotational ring 71, and the slide piece 72 travels through a through-hole 22e formed in the body 22a of the operating portion, and the stepped portion 65 of the mouthpiece 61 is fitted to a small hole 72a formed in the slide piece 72. That is, attachment to and detachment from the fixing mechanism 22c can be freely performed by the small hole 72a and the stepped portion 65 provided on the mouthpiece 61. The pin 64a is engaged with a slitting portion 22f of the body 22a of the operating portion, thereby restricting the rotation of the sheath 23 and the operating portion 22.

[0027] As shown in (d) and (e) of the figure, an insertion hole 76 is moved with respect to the slider 22d while pushing an operating button 75 provided on the slider 22d and is caused to coincide with a through-hole 22g formed in the slider 22d,

and the fastening device 68 is inserted thereinto. When the hand is taken from the operating button 75 after the fastening device is inserted, the stepped portion 68a of the fastening device 68 is fitted, connected, and fixed to a joint 78 by the urging force of a spring 77.

[0028] As described above, attachment to and detachment from the sheath 23 can be easily performed by the two-body mouthpiece 61, and therefore the same forceps-operating portion can be effectively used both when the endoscopic treatment device 20 is inserted from the distal-end side of the treatment-device channel and when inserted from the rear-end side thereof.

[0029]

[Effects of the invention] As described above, according to the present invention, it is possible to provide an endoscopic treatment device in which a connecting member does not drop off even if a defect in caulking or a defect in welding occurs in the connecting member that pivotably supports the constituent elements of a forceps portion.

[Brief description of the drawings]

[Fig. 1] Fig. 1 or Fig. 5 is related to one embodiment of the present invention, and Fig. 1 is an exploded perspective view that shows the component structure of the forceps portion.

[Fig. 2] Explanatory drawing that shows a connected state and

an assembled state between the forceps member of the V-shaped forceps instrument and the arm member:

(a) explanatory sectional view that shows a connection between the forceps member and the arm member,

(b) explanatory sectional view that shows a connected state of the forceps portion

[Fig. 3] Perspective view that shows the schematic structure of the forceps portion and the connecting member

[Fig. 4] Explanatory sectional view that shows the relationship between the connecting member of the forceps portion and the other constituent elements

[Fig. 5] (a) Explanatory drawing that shows the schematic structure of the endoscopic treatment device

(b) Explanatory drawing that shows the opened state of the forceps portion of the endoscopic treatment device

[Fig. 6] Explanatory drawing that shows the schematic structure of the cover member according to the first modification of the embodiment

[Fig. 7] Explanatory drawing that shows the schematic structure of the cover member according to the second modification of this embodiment

[Fig. 8]

Explanatory drawing that shows the structure of the proximal

end of the sheath attachable to and detachable from the operating portion:

- (a) Explanatory drawing that shows the sheath proximal end, the mouthpiece, and the fastening device
- (b) Sectional view of the fixing mechanism
- (c) C-C sectional view of (b) of the figure
- (d) Schematic explanatory sectional view of the slider
- (e) D-D sectional view of (e) of the figure

[Fig. 9] Fig. 9 and Fig. 10 are related to prior art, and Fig. 9 is an explanatory drawing that shows the schematic structure of the endoscopic treatment device

[Fig. 10]

- (a) Explanatory drawing that shows a state in which the forceps member and the arm member are caulked and connected
- (b) Explanatory drawing that shows a state when the headed pin is inserted into the through-hole formed in the forceps member and the arm member
- (c) Explanatory drawing that shows a state when the headed pin drops off
- (d) Explanatory drawing that shows a state when the headed pin is connected by welding

[Description of signs]

20... Endoscopic treatment device

22b ... Operating wire

24a ... Forceps member
24b ... Forceps member
26... Connecting member
27a ... Arm member
27b ... Arm member
29a ... Cover member
29b ... Cover member
30... Connecting member

Fig.1

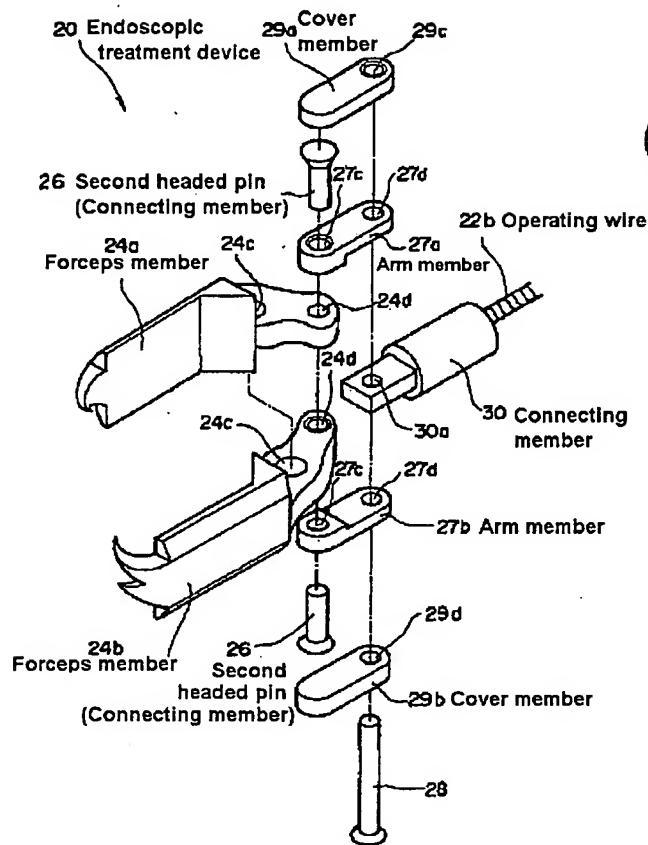


Fig.5

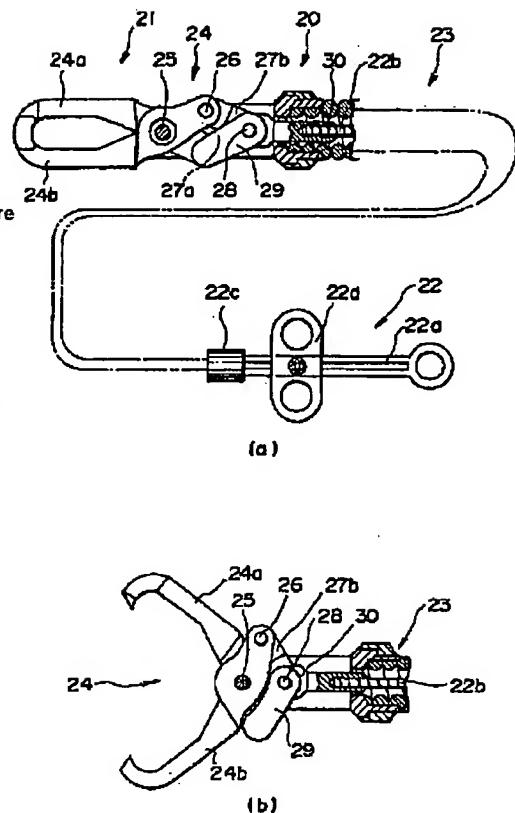


Fig.3

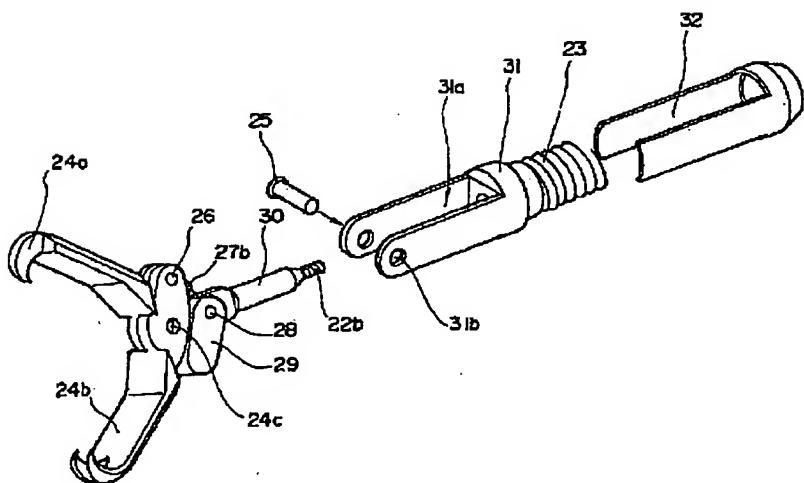


Fig.2

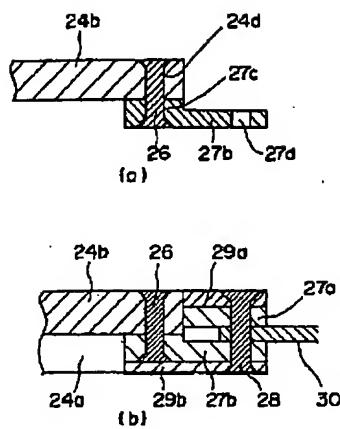


Fig.4

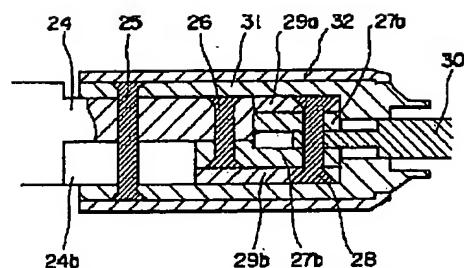


Fig.6

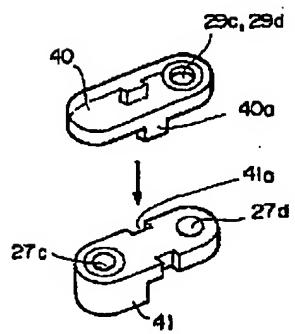


Fig.10

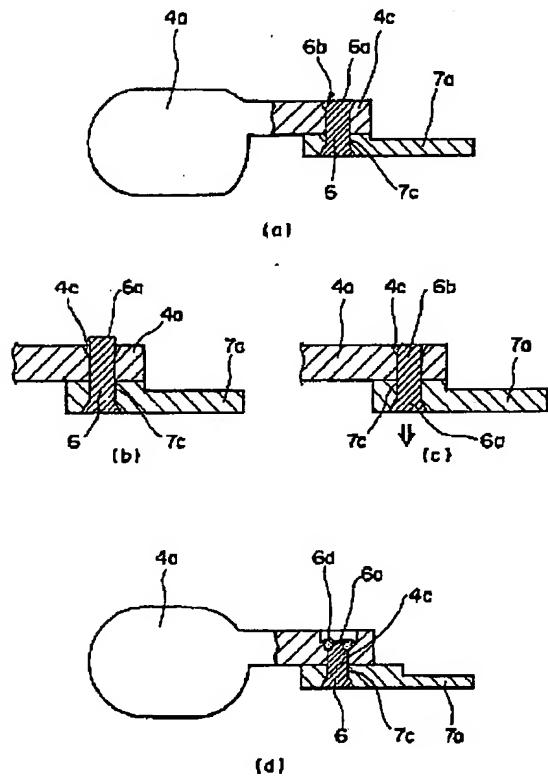


Fig.7

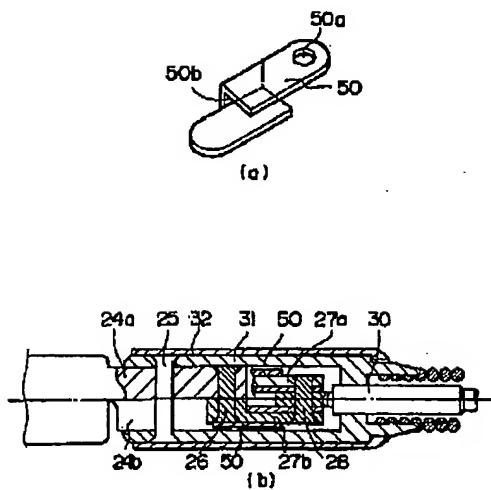


Fig.8

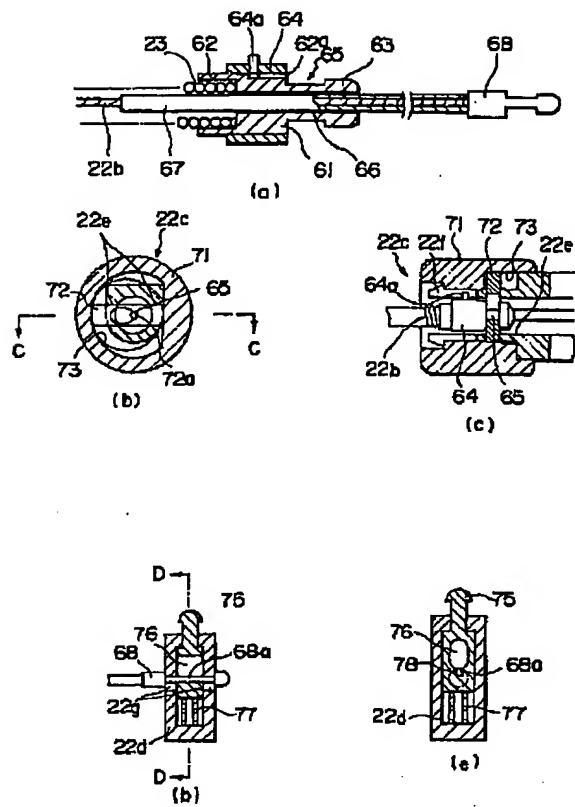
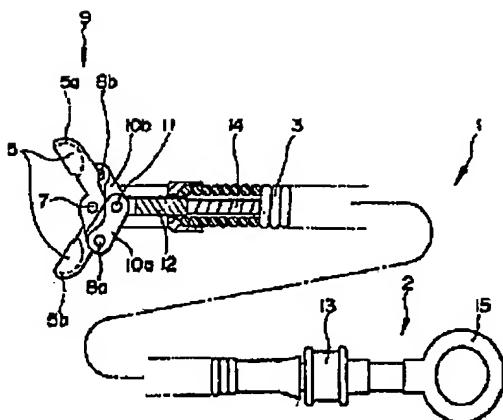


Fig.9



[Amendment]

[Filing date] October 23, 1993

[Amendment 1]

[Name of document to be amended] Specification

[Name of item to be amended] 0003

[Method of amendment] Change

[Contents of amendment]

[0003] As shown in Fig. 9, a biopsy forceps 1 is made up of an operating portion 2 provided at a proximal-end side, a flexible, slender sheath 3 extended in front of the operating portion 2, and a forceps portion 4 provided at the tip part of the sheath 3. The forceps portion 4 pivotably supports forceps members 5a and 5b having a pair of biopsy cups at its tip by means of a first pin 7 at the front end of a tip chip 6 connected to the tip of the sheath 3. The proximal end of the forceps members 5a and 5b is attached to one end of arm members 10a and 10b forming a pantograph mechanism 9 by means of a second pin 8. The other end of the arm members 10a and 10b is connected to a wire connector 12 by means of a third pin 11. The wire connector 12 is connected to a forceps-opening-and-closing wire 14 which is passed through the sheath 3 and which is connected to a slider 13 provided at the operating portion 2. The wire 14 moves the wire connector 12 in the axial

direction by moving back and forth the slider 13 and a holding ring 15 provided behind the slider 13, and thereby opens and closes the forceps portion 4 through the pantograph mechanism 9.

[Amendment 2]

[Name of document to be amended] Specification

[Name of item to be amended] 0005

[Method of amendment] Change

[Contents of amendment] [0005]

[Problems to be solved by the Invention] As mentioned above, the forceps member and the arm member forming the pantograph mechanism of the forceps portion have been pivotably supported by inserting the headed pin serving as a connecting member into the through-hole formed in the forceps member and the through-hole formed in the arm member and by riveting or welding the top of the headed pin.

[Amendment 3]

[Name of document to be amended] Specification

[Name of item to be amended] 0012

[Method of amendment] Change

[Contents of amendment]

[0012] As shown in Fig. 1, the forceps portion 24 of the endoscopic treatment device 20 is made up of the pair of forceps

members 24a and 24b, the arm members 27a and 27b pivotably connected to the forceps members 24a and 24b by means of the headed pin 26 which is a second connecting member, cover members 29a and 29b firmly bonded to the side face of the head of the headed pin 26 inserted into the arm members 27a and 27b, and a connecting member 30 pivotably connecting the arm members 27a and 27b together by means of the headed pin 28 which is a third connecting member.

[Amendment 4]

[Name of document to be amended] Specification

[Name of item to be amended] 0015

[Method of amendment] Change

[Contents of amendment]

[0015] Thereafter, as shown in (b) of Fig. 2, the cover member 29b is disposed on the plane on the side of the countersink of the through-hole 27c with a countersink of the arm member 27b, and the headed-pin-inserting through-hole 27d of the arm member 27b is caused to coincide with the through-hole 29d with a countersink of the cover member 29b, and they are united and fixed by an adhesive or the like. Likewise, the cover member 29a is united with and fixed to the arm member 27a. Thereafter, the headed pin 28 is inserted into the through-holes 29d and 27d of the cover member 29b united with the arm member 27b,

and the headed pin 28 is inserted into a through-hole 30a of a connecting member 30. Thereafter, they are pivotably supported by inserting the headed pin 28 into the through-holes 27d and 29c of the arm member 27a and then riveting the top of the headed pin 28. The thus achieved condition is the perspective view of the forceps portion 24 shown in Fig. 3.

[Amendment 5]

[Name of document to be amended] Drawing

[Name of item to be amended] Fig. 1

[Method of amendment] Change

[Contents of amendment]

[Fig. 1]

[Amendment 6]

[Name of document to be amended] Drawing

[Name of item to be amended] Fig. 2

[Method of amendment] Change

[Contents of amendment]

[Fig. 2]

[Amendment 7]

[Name of document to be amended] Drawing

[Name of item to be amended] Fig. 9

[Method of amendment] Change

[Contents of amendment]

[Fig. 9]

[Amendment 8]

[Name of document to be amended] Drawing

[Name of item to be amended] Fig. 10

[Method of amendment] Change

[Contents of amendment]

[Fig. 10]

Fig.1

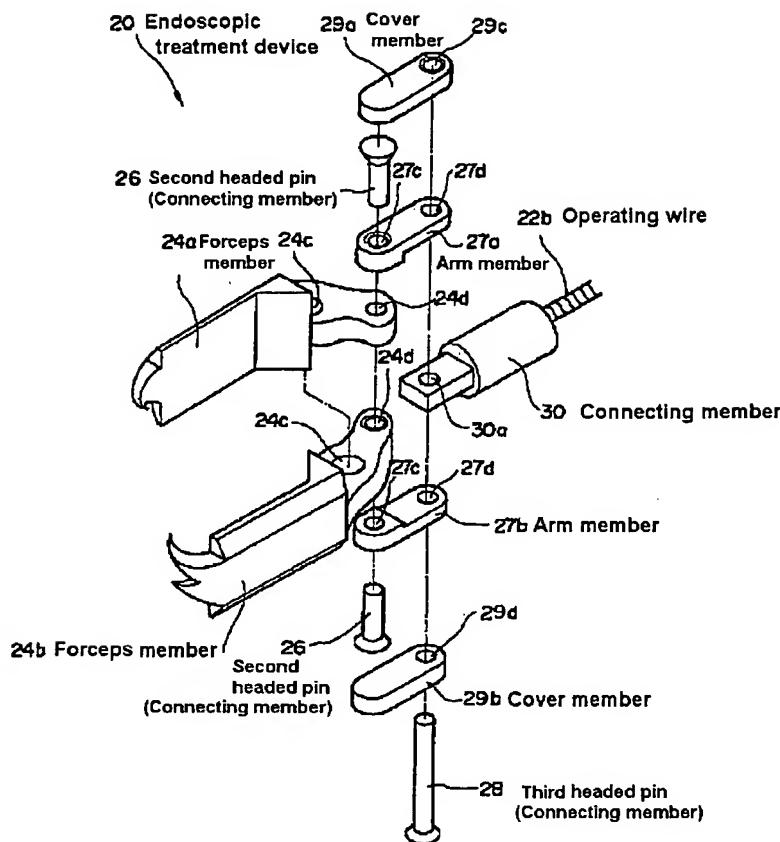


Fig.9

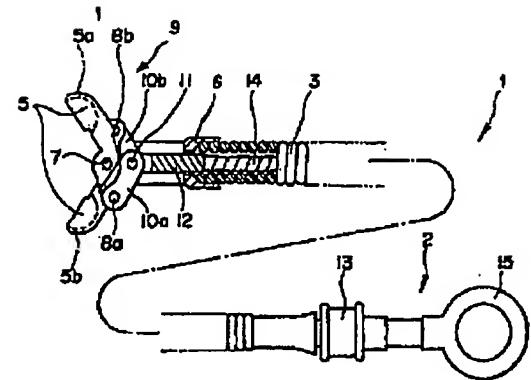


Fig.2

